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## NOTICE OF ALLOWANCE AND FEE(S) DUE

20311 7590 10/07/2008

LUCAS & MERCANTI, LLP  
475 PARK AVENUE SOUTH  
15TH FLOOR  
NEW YORK, NY 10016

EXAMINER

NGUYEN, NGOC YEN M

ART UNIT

PAPER NUMBER

1793

DATE MAILED: 10/07/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/563,781

09/12/2006

Jan-Otto Hoel

E-1061

3149

TITLE OF INVENTION: METHOD FOR PRODUCTION OF TRICHLOROSILANE AND SILICON FOR USE IN THE PRODUCTION OF TRICHLOROSILANE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	01/07/2009

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

#### I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

20311 7590 10/07/2008

**LUCAS & MERCANTI, LLP**  
475 PARK AVENUE SOUTH  
15TH FLOOR  
NEW YORK, NY 10016

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/563,781 09/12/2006 Jan-Otto Hoel E-1061 3149

TITLE OF INVENTION: METHOD FOR PRODUCTION OF TRICHLOROSILANE AND SILICON FOR USE IN THE PRODUCTION OF TRICHLOROSILANE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1510 \$300 \$0 \$1810 01/07/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
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NGUYEN, NGOC YEN M 1793 423-342000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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10/563,781	09/12/2006	Jan-Otto Hoel	E-1061	3149
20311	7590	10/07/2008	EXAMINER	
LUCAS & MERCANTI, LLP 475 PARK AVENUE SOUTH 15TH FLOOR NEW YORK, NY 10016			NGUYEN, NGOC YEN M	
			ART UNIT	PAPER NUMBER
			1793	
DATE MAILED: 10/07/2008				

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 330 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 330 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/563,781	HOEL ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Ngoc-Yen M. Nguyen	1793	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 9/12/2006.
2. ☒ The allowed claim(s) is/are 1-6 and 12-19.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date <u>3/30/06</u></li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application</li> <li>6. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date _____.</li> <li>7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other _____.</li> </ol> |
|--|---|

**DETAILED ACTION**

Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I , claim(s) 1-6, 12, 19, drawn to a method for the production of trichlorosilane.

Group II, claim(s) 7-11, drawn to a silicon product.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Unity exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding claimed technical features. The express "special technical features" is defined as meaning those technical features that define a contribution which each of the inventions, considered as a whole, makes over the prior art." (Rule 13.2). The question of unity of invention has been reconsidered retroactively by the examiner in view of the search performed; a review of Dosaj et al (4,247,528) appears to demonstrate that the technical feature(i.e. silicon containing 30-10,000 ppm or chromium) does not define a contribution which each of the inventions, considered as a whole, makes over the prior art (note Dosaj '528, Table 3). Thus, lack of unity becomes apparent "a posteriori" after taking the prior art into consideration.

Accordingly, the prior art of the record supports restriction of the claimed subject matter in to the groups as mentioned immediately above.

During a telephone conversation with Mr. Donald Lucas on September 26, 2008 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-6, 12-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 7-11 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Donald Lucas on October 1, 2008.

The application has been amended as follows:

Art Unit: 1793

1. (Currently amended) Method for the production of trichlorosilane by reaction of silicon with ~~HCl~~ HCl gas at a temperature between 250° and 1100°C, and an absolute pressure of 0.5-30 atm in a fluidized bed reactor, in a stirred bed reactor or in a solid bed reactor, characterized in that the silicon supplied to the reactor contains between 30 and 10,000 ppm chromium.

2. (Original) Method according to claim 1, characterized in that the silicon supplied to the reactor contains between 50 and 1,000 ppm chromium.

3. (Currently Amended) Method according to claim 1, characterized in that the chromium is alloyed with the silicon.

4. (Currently Amended) Method according to claim 1, characterized in that the chromium is mechanically mixed with the silicon before the silicon is supplied to the reactor.

5. (Currently amended) Method according to claim 4, characterized in that the chromium is mechanically mixed with the silicon by subjecting the silicon to grinding using

Art Unit: 1793

chromium-containing grinding bodies.

6. (Currently Amended) Method according to claim 1, characterized in that the chromium is added to the reactor separately from the silicon.

7 -11 (Cancelled)

12. (Currently amended) Method for the production of trichlorosilane by reaction of silicon with ~~HCl~~ HCl gas at a temperature between 250 and ~~1100~~ 1100<sup>°C</sup>, and an absolute pressure of 0.5 - 30 atm in a fluidized bed reactor, in a stirred bed reactor or in a solid bed reactor, characterized in that chromium is supplied to the reactor in an amount necessary to control a chromium content in the reactor of between 100 and 50,000 ppm based on the weight of silicon in the reactor.

13. (Currently amended) Method according to claim 12, characterized in that the chromium is supplied to the reactor in an amount necessary to control the chromium content in the reactor between 200 and 25,000 ppm chromium.

14. (Currently Amended) Method according to claim 12,



Art Unit: 1793

characterized in that the chromium supplied to the reactor is alloyed with the silicon.

15. (Currently Amended) Method according to claim 12, characterized in that the chromium supplied to the reactor is mechanically mixed with the silicon before the resulting mixture is supplied to the reactor.

16. (Currently amended) Method according to claim 15, characterized in that the chromium is mechanically mixed with the silicon by subjecting the silicon to grinding using chromium-containing grinding bodies.

17. (Currently Amended) Method according to claim 12, characterized in that the chromium and the silicon are added separately to the reactor.

18. (Currently Amended) Method according to claim 17, characterized in that chromium compounds are used as the source for the chromium compounds and the chromium compounds are added to the reactor with the ~~HCl~~ HCl gas.

Art Unit: 1793

19. (Currently Amended) Method according to claim 12, characterized in that the chromium is added to the reactor together with a compound having ~~another~~ or no effect on the ~~trichlorosilane~~ trichlorosilane process.

The following is an examiner's statement of reasons for allowance: the prior art does not teach or suggest a process for producing trichlorosilane by reacting silicon with HCl gas at the required temperature and pressure in the presence of 30-10,000 ppm or chromium. As clearly shown in the instant specification and drawings, the presence of the chromium in the process improves the trichlorosilane selectivity as compared to the same process but without the chromium at any given silicon conversion percentage.

It is conventional in the art that trichlorosilane can be produced using technical grade silicon (Barker, Jr. 4,585,643, column 3, lines 36-44) or metallurgical grade silicon (Wakamatsu et al, "Study on selectivity in trichlorosilane production reaction"), however, as evidenced by Malysheva et al ("Phase changes of cathode copper", Russian Journal of Applied Chemistry, 49 (10), 1976, pp. 2236-2240), the common technical grade Si does not contain chromium (note page 2236, 6<sup>th</sup> full paragraph) and as evidenced by Kutsovsky '521, metallurgical grade silicon may contain 5 ppm or more (e.g. 5-150 ppm) of chromium (note paragraph [0010]), the presence of chromium in the amount of 30-10,000 ppm in the technical grade or metallurgical grade silicon cannot be considered as "inherent". The presence of the unexpected result as shown in the Figures of the instant specification is sufficient to overcome any rejection relying on the optimization of the chromium amount in the silicon starting material.

Inukai et al (6,506,923) and Jung 5,338,876 similarly teach that copper catalyst containing chromium may be used in process for producing organohalosilanes (note Inukai '923, column 1, lines 61-66 and claim 1 and Jung '876, claim 18). Even if the teaching of Inukai '923 can be transferred from a process of producing organohalosilanes (organic compounds) to a process of producing halosilanes (inorganic compounds), such teaching still does not teach or suggest that the presence of chromium would increase the selectivity of trichlorosilane. It should be noted that Jung '876 fairly teaches that the co-catalysts are selected to "enhance the reactivity of silicon metal and shorten the induction period and *increase the selectivity of dimethyldichlorosilane production*", however, the increase in selectivity of dimethyldichlorosilane as taught in Jung '876 cannot be transferred to the increase in selectivity of trichlorosilane or any other compound.

Kalchauer et al (2002/015737) discloses that for the chlorosilane synthesis, the presence of Ni or Cr in the silicon "do not act as catalyst poisons" (note paragraph [0024]). This appears to teach away from using Cr as a catalyst. There is no disclosure for the amount of chromium in the silicon so the presence of chromium in Kalchauer '737 cannot be considered as inherently having the desired "catalytic effect" as shown in the instant specification. Again, the showing of unexpected results in the instant specification is sufficient to overcome any rejection relying on the optimization of the chromium amount in the silicon starting material.

Art Unit: 1793

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1793

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/  
Primary Examiner, Art Unit 1793

nmn  
October 8, 2008